

What is claimed is:

1. A semiconductor apparatus which protects a first-conductivity-type MOS output transistor against a surge entering through an output electrode connected to a drain of said first-conductivity-type MOS output transistor, said apparatus comprising:

10 a first-conductivity-type MOS protection transistor having a drain connected to the drain of said first-conductivity-type MOS output transistor, a source connected to a source of said first-conductivity-type MOS output transistor, and a gate connected to a second-conductivity-type layer under a gate of said first-conductivity-type MOS output transistor.

2. The semiconductor apparatus according to claim 1, wherein  
15 said first-conductivity-type MOS output transistor and said first-conductivity-type MOS protection transistor are of an SOI structure.

3. The semiconductor apparatus according to claim 2, comprising:  
20 a second-conductivity-type area connected to said second-conductivity-type layer under the gate of said first-conductivity-type MOS output transistor,

25 wherein the gate of said first-conductivity-type MOS protection transistor is connected via said second-conductivity-type area to said second-conductivity-type layer under the gate of said first-conductivity-type MOS output transistor.

4. The semiconductor apparatus according to claim 1, wherein the

gate of said first-conductivity-type MOS protection transistor is connected by an electrode wiring to said second-conductivity-type layer under the gate of said first-conductivity-type MOS output transistor.

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5. The semiconductor apparatus according to claim 1, wherein the drain of said first-conductivity-type MOS protection transistor is formed closer to the output electrode than the drain of said first-conductivity-type MOS output transistor.

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6. The semiconductor apparatus according to claim 1, wherein said first-conductivity-type MOS protection transistor is higher in electrostatic destruction withstand voltage than said first-conductivity-type MOS output transistor.

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7. The semiconductor apparatus according to claim 6, wherein said first-conductivity-type MOS output transistor and said first-conductivity-type MOS protection transistor are of an SOI structure.

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8. The semiconductor apparatus according to claim 7, comprising:  
a second-conductivity-type area connected to said second-conductivity-type layer under the gate of said first-conductivity-type MOS output transistor,

wherein the gate of said first-conductivity-type MOS protection transistor is connected via said second-conductivity-type area to said second-conductivity-type layer under the gate of said first-conductivity-type MOS output transistor.

9. The semiconductor apparatus according to claim 6, wherein the  
gate of said first-conductivity-type MOS protection transistor is  
connected by an electrode wiring to said second-conductivity-type  
5 layer under the gate of said first-conductivity-type MOS output  
transistor.

10. The semiconductor apparatus according to claim 6, wherein the  
drain of said first-conductivity-type MOS protection transistor is  
10 formed closer to the output electrode than the drain of said first-  
conductivity-type MOS output transistor.

11. The semiconductor apparatus according to claim 10, wherein  
said first-conductivity-type MOS output transistor and said first-  
15 conductivity-type MOS protection transistor are of an SOI structure.

12. The semiconductor apparatus according to claim 11, comprising:  
a second-conductivity-type area connected to said second-  
conductivity-type layer under the gate of said first-conductivity-type  
20 MOS output transistor,

wherein the gate of said first-conductivity-type MOS protection  
transistor is connected via said second-conductivity-type area to said  
second-conductivity-type layer under the gate of said first-  
conductivity-type MOS output transistor.

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13. The semiconductor apparatus according to claim 10, wherein  
the gate of said first-conductivity-type MOS protection transistor is

connected by an electrode wiring to said second-conductivity-type layer under the gate of said first-conductivity-type MOS output transistor.

5       14.     The semiconductor apparatus according to claim 13, wherein  
said first-conductivity-type MOS output transistor and said first-  
conductivity-type MOS protection transistor are of an SOI structure.

10      15.     The semiconductor apparatus according to claim 14,  
comprising:

          a second-conductivity-type area connected to said second-  
conductivity-type layer under the gate of said first-conductivity-type  
MOS output transistor,

15      wherein the gate of said first-conductivity-type MOS protection  
transistor is connected via said second-conductivity-type area to said  
second-conductivity-type layer under the gate of said first-  
conductivity-type MOS output transistor.

20      16.     A semiconductor apparatus which protects a first-conductivity-  
type MOS output transistor and a second-conductivity-type MOS  
output transistor against a surge entering through an output electrode  
connected to each of drains of said first-conductivity-type MOS output  
transistor whose source is connected to ground and said second-  
conductivity-type MOS output transistor whose source is connected to  
25     a power supply, said apparatus comprising:

          a first-conductivity-type MOS protection transistor having a  
drain connected to the drain of said first-conductivity-type MOS

output transistor, a source connected to a source of said first-conductivity-type MOS output transistor, and a gate connected to a second-conductivity-type layer under a gate of said first-conductivity-type MOS output transistor; and

5           a second-conductivity-type MOS protection transistor having a drain connected to the drain of said second-conductivity-type MOS output transistor, a source connected to a source of said second-conductivity-type MOS output transistor, and a gate connected to a first-conductivity-type layer under a gate of said second-conductivity-type MOS output transistor.

10           17. The semiconductor apparatus according to claim 16, wherein  
said first-conductivity-type MOS output transistor, said first-conductivity-type MOS protection transistor, said second-conductivity-type MOS output transistor, and said second-conductivity-type MOS protection transistor are of an SOI structure.

15           18. The semiconductor apparatus according to claim 17,  
comprising:

20           a second-conductivity-type area connected to said second-conductivity-type layer under the gate of said first-conductivity-type MOS output transistor; and

25           a first-conductivity-type area connected to said first-conductivity-type layer under the gate of said second-conductivity-type MOS output transistor,

              wherein the gate of said first-conductivity-type MOS protection transistor is connected via said second-conductivity-type area to said

second-conductivity-type layer under the gate of said first-conductivity-type MOS output transistor, and

wherein the gate of said second-conductivity-type MOS protection transistor is connected via said first-conductivity-type area 5 to said first-conductivity-type layer under the gate of said second-conductivity-type MOS output transistor.

19. The semiconductor apparatus according to claim 16, wherein the gates of said first-conductivity-type MOS protection transistor and 10 said second-conductivity-type MOS protection transistor are connected by electrode wirings respectively to said second-conductivity-type layer under the gate of said first-conductivity-type MOS output transistor and to said first-conductivity-type layer under the gate of said second-conductivity-type MOS output transistor.

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20. The semiconductor apparatus according to claim 16, wherein the drains of said first-conductivity-type MOS protection transistor and said second-conductivity-type MOS protection transistor are formed closer to the output electrode than the drains of said first-conductivity-type MOS output transistor and said second-conductivity-type MOS output transistor.

21. The semiconductor apparatus according to claim 16, wherein said first-conductivity-type MOS protection transistor and said second-conductivity-type MOS protection transistor are higher in electrostatic destruction withstand voltage than said first-conductivity-type MOS output transistor and said second-conductivity-

type MOS output transistor.

22. The semiconductor apparatus according to claim 21, wherein  
said first-conductivity-type MOS output transistor, said first-  
conductivity-type MOS protection transistor, said second-conductivity-  
type MOS output transistor, and said second-conductivity-type MOS  
protection transistor are of an SOI structure.

23. The semiconductor apparatus according to claim 22,  
10 comprising:

a second-conductivity-type area connected to said second-  
conductivity-type layer under the gate of said first-conductivity-type  
MOS output transistor; and

15 a first-conductivity-type area connected to said first-  
conductivity-type layer under the gate of said second-conductivity-type  
MOS output transistor,

wherein the gate of said first-conductivity-type MOS protection  
transistor is connected via said second-conductivity-type area to said  
second-conductivity-type layer under the gate of said first-  
20 conductivity-type MOS output transistor, and

wherein the gate of said second-conductivity-type MOS  
protection transistor is connected via said first-conductivity-type area  
to said first-conductivity-type layer under the gate of said second-  
conductivity-type MOS output transistor.

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24. The semiconductor apparatus according to claim 21, wherein  
the gates of said first-conductivity-type MOS protection transistor and

5        said second-conductivity-type MOS protection transistor are connected by electrode wirings respectively to said second-conductivity-type layer under the gate of said first-conductivity-type MOS output transistor and to said first-conductivity-type layer under the gate of  
5        said second-conductivity-type MOS output transistor.

10      25. The semiconductor apparatus according to claim 21, wherein the drains of said first-conductivity-type MOS protection transistor and said second-conductivity-type MOS protection transistor are formed closer to the output electrode than the drains of said first-conductivity-type MOS output transistor and said second-conductivity-type MOS output transistor.

15      26. The semiconductor apparatus according to claim 25, wherein said first-conductivity-type MOS output transistor, said first-conductivity-type MOS protection transistor, said second-conductivity-type MOS output transistor, and said second-conductivity-type MOS protection transistor are of an SOI structure.

20      27. The semiconductor apparatus according to claim 26, comprising:

          a second-conductivity-type area connected to said second-conductivity-type layer under the gate of said first-conductivity-type MOS output transistor; and

25      a first-conductivity-type area connected to said first-conductivity-type layer under the gate of said second-conductivity-type MOS output transistor,

wherein the gate of said first-conductivity-type MOS protection transistor is connected via said second-conductivity-type area to said second-conductivity-type layer under the gate of said first-conductivity-type MOS output transistor, and

5        wherein the gate of said second-conductivity-type MOS protection transistor is connected via said first-conductivity-type area to said first-conductivity-type layer under the gate of said second-conductivity-type MOS output transistor.

10      28. The semiconductor apparatus according to claim 25, wherein the gates of said first-conductivity-type MOS protection transistor and said second-conductivity-type MOS protection transistor are connected by electrode wirings respectively to said second-conductivity-type layer under the gate of said first-conductivity-type MOS output transistor and to said first-conductivity-type layer under the gate of 15      said second-conductivity-type MOS output transistor.

20      29. The semiconductor apparatus according to claim 28, wherein said first-conductivity-type MOS output transistor, said first-conductivity-type MOS protection transistor, said second-conductivity-type MOS output transistor, and said second-conductivity-type MOS protection transistor are of an SOI structure.

25      30. The semiconductor apparatus according to claim 29, comprising:  
                a second-conductivity-type area connected to said second-conductivity-type layer under the gate of said first-conductivity-type

MOS output transistor; and

a first-conductivity-type area connected to said first-conductivity-type layer under the gate of said second-conductivity-type MOS output transistor,

5 wherein the gate of said first-conductivity-type MOS protection transistor is connected via said second-conductivity-type area to said second-conductivity-type layer under the gate of said first-conductivity-type MOS output transistor, and

10 wherein the gate of said second-conductivity-type MOS protection transistor is connected via said first-conductivity-type area to said first-conductivity-type layer under the gate of said second-conductivity-type MOS output transistor.